

A NEW SPECIES OF VENOMOUS ECHINOID FROM QUEENSLAND WATERS

R. ENDEAN

University of Queensland

Two echinothurids trawled from a depth of 47 fathoms in southern Queensland waters could not be referred to any known species. The larger specimen is selected as the holotype of a new species and a specific description follows.

Family **ECHINOTHURIDAE** Wyville Thomson

Genus **ASTHENOSOMA** Grube

ASTHENOSOMA PERICULOSUM sp. nov.

Plate 12, figures 1-2; figure 1 A-F

SHAPE AND DIMENSIONS.—The test is low, flexible, and possesses an ambitus which is almost circular in outline. It is approximately 87 mm. in diameter.

AMBULACRA.—There are 63-64 plates in each column of the ambulacra. About 26 of these plates are found on the oral surface. Here, many of them bear two primary tubercles, one in the poriferous zone and one in the non-poriferous zone. The latter tubercle is the larger and occupies the whole height of the plate which bears it. However, there is a tendency for this large primary tubercle to be present only on every second ambulacral plate. Although somewhat irregularly arranged, these tubercles form in each column of each ambulacrum a series which converges distally towards the mid-line of the ambulacrum. The primary tubercles in the poriferous areas are present on each ambulacral plate and form a regular series. A variable number of secondary tubercles occurs on each ambulacral plate.

Near the ambitus primary tubercles disappear and each ambulacral plate carries a horizontal row of 16-17 secondary tubercles. Such horizontal rows of secondary tubercles are found on the ambulacral plates of the aboral surface. The number of tubercles per row decreases apically as the ambulacral plates become shorter, and the most distal ambulacral plate in each column is usually devoid of tubercles. Adorally, the tube-feet, which possess well developed sucking discs, are arranged in distinct arcs of three, but on the aboral surface they tend to form an almost horizontal line. The small demi-plates of each ambulacral plate are enclosed between the borders of each two successive primary plates.

INTERAMBULACRA.—There are 36-37 plates in each column of the interambulacra. About 16 of these plates are found on the oral surface. Each of these oral interambulacral plates bears two, occasionally three, primary tubercles. A large primary tubercle is carried at the adradial end of each of these plates and these tubercles form a regular series. The other primary tubercles

on these plates are irregularly arranged. Numerous secondary tubercles occur on these plates. Near the ambitus, the primary tubercles disappear and each interambulacral plate carries from 25–27 secondary tubercles in an almost horizontal line. On the aboral surface the number of tubercles carried per interambulacral plate decreases towards the apex of each interambulacrum. There is a tendency for the central region of each aboral interambulacral plate to be narrower than the ends, and for the admedial end of each plate to be turned orally.

Membranous areas are found between the plates of the test, and these membranous interstices are widest between the plates of the interambulacra on the aboral surface. The ambulacral plates bovel under the interambulacral plates. The interambulacra are wider than the ambulacra at the ambitus. The tubercles carried by the plates of the test are perforate, but non-crenulate.

APICAL SYSTEM.—The apical system is not disconnected, and the genital and ocular plates are not subdivided. Genital papillae are found in membranous areas at the distal regions of the genital plates, which extend into the interambulacral mid-lines. The madreporic pores are confined to the second genital plate. There are about 60 small periproctal plates, which bear tubercles, but which exhibit no regular arrangement. Imbricating scales cover the anal papilla.

PERISTOME.—Overlapping plates, which bear tubercles on their edges, cover the peristome. There are twelve such plates in each column. Proximally, the pore-pairs are arranged in a single series, but on the outer plates the pore-pairs are biserial. Small gills are present at the edge of the peristome off the interambulacra.

SPINES.—The primary spines (fig. 1 F) of the oral surface are curved and average about 12 mm. in length. They possess very fine thorns on the distal part and terminate in white hoofs, each about 1 mm. in length. The hoofs are often widest at their bases and do not flare. Fine thorns are also possessed by the secondary spines of the oral surface. These spines average about 4 mm. in length and contain longitudinal rows of perforations. The aboral spines average about 5 mm. in length and are smooth and pointed. Those of the ambulacra are covered with thin skin, whilst those of the interambulacra possess thick glandular skin-sacs. No small poison-spines of the type possessed by *A. varium* Grube were observed.

PEDICELLARIAE.—Tridentate and triphyllous pedicellariae of the same types as are found in other species of *Asthenosoma* are present and, in addition, dactyloous pedicellariae are prominent. The dactyloous pedicellariae (fig. 1 B) appear to be confined to the aboral surface and are noteworthy because of the length of their glandular mass. The stalks which carry the glandular mass are 4–5 mm. in length, and the glandular mass itself is 2–3 mm. in length. The pedicellariae are three-valved, but the valves are small and completely enclosed by the glandular mass which extends far beyond them. Each valve (fig. 1 C) has the form of a rod borne on a basal piece set at right angles to it.

Two kinds of tridentate pedicellariae occur. The larger type (fig. 1 E) averages 1.4 mm. in length and possesses concave valves which are leaf-shaped in outline. Each valve is thickened medially by the development of an open meshwork, but carries no median crest or keel. The edges of each valve are slightly sinuate and minutely serrated. Adjacent valves are in contact for most of their length. These large tridentate pedicellariae can be distinguished readily from those of other species of *Asthenosoma*.

The second type of tridentate pedicellaria (fig. 1 A) averages 0.65 mm. in length and possesses long narrow valves with straight edges. Adjacent valves are in contact for their whole length and each is thickened medially. Although lacking a toothed median keel, these pedicellariae resemble the small tridentate pedicellariae possessed by *A. ijimai* Yoshiwara.

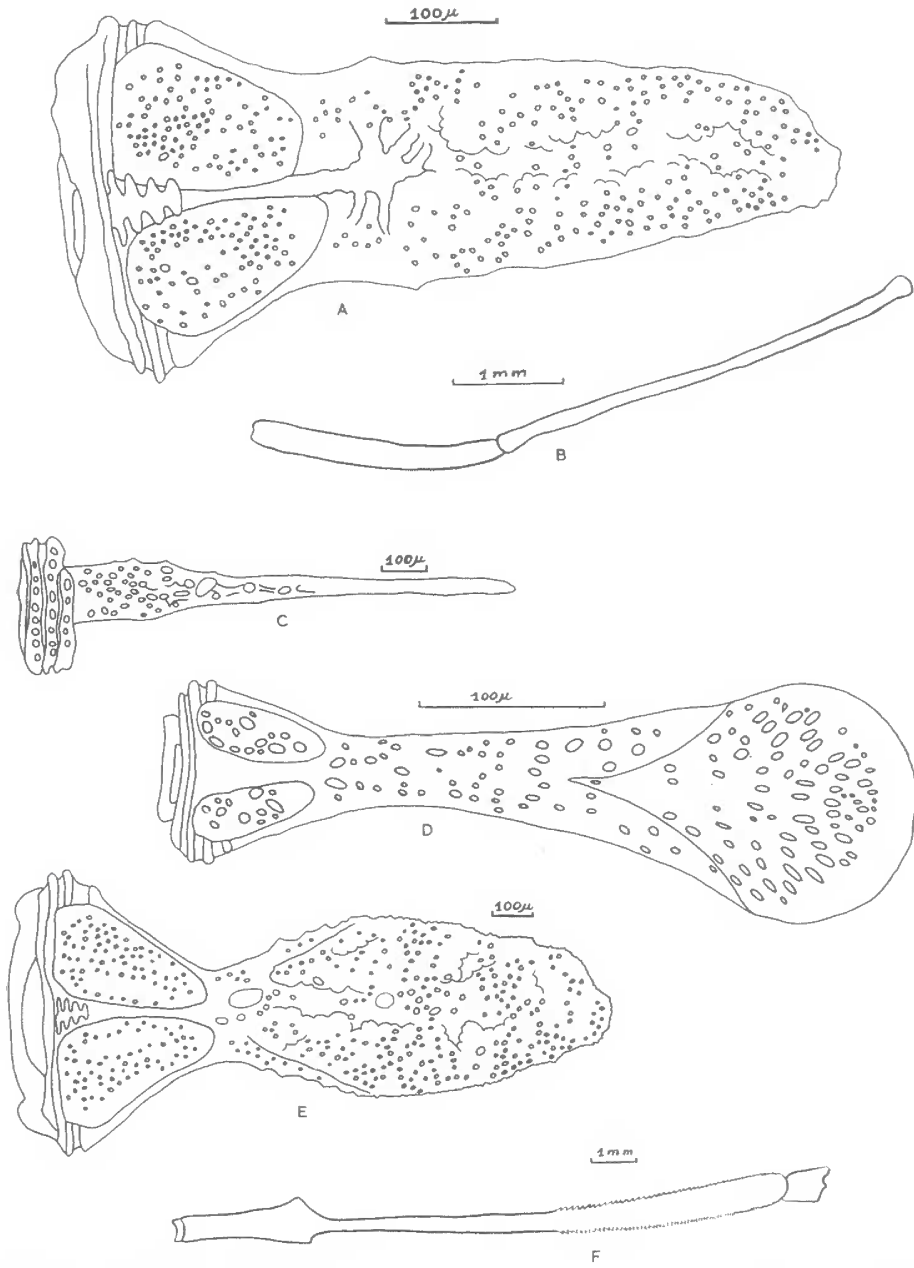


Figure 1.—*Asthenosoma periculosum* sp. nov. A, valve of small tridentate pedicellaria; B, dactyloous pedicellaria; C, valve of dactyloous pedicellaria; D, valve of triphyloous pedicellaria; E, valve of large tridentate pedicellaria; F, primary spine from oral surface.

The triphyllous pedicellariae (fig. 1 D), which average about 0.45 mm. in length, appear to be confined to the aboral surface. Each valve has a slit in the cover-plate as is found in the triphyllous pedicellariae of other species of *Asthenosoma*.

SPHAERIDIA.—Club-shaped sphaeridia occur on the inner demiplates of some of the ambulacral plates, both on the oral and aboral surfaces.

COLOUR.—Aborally, the ambulacral plates are a purplish-brown as are the adradial ends of the interambulacral plates. Patches of purplish-brown occur apically in the interambulacral mid-line, but the major part of each interambulacrum is light brown. Orally, both ambulacral and interambulacral areas are purplish-brown. The primary spines are light greenish banded with purplish-brown. The skin sheathing the ambulacral spines aborally is purplish, whilst the skin-sacs of the aboral interambulacral spines are purplish-black. The glandular mass of each dactyloous pedicellaria is also purplish-black.

TYPES.—The holotype, G. 2604, and paratype, G. 2603, have been lodged with the Queensland Museum.

TYPE LOCALITY.—Both holotype and paratype were trawled, together with fan corals, from a depth of 47 fathoms, approximately five miles due east of Stradbroke Island (1/7/1961) by a party under the direction of Professor W. Stephenson.

VARIATION.—The paratype is 83 mm. in diameter and possesses 62–63 plates in each column of the ambulacra and 35–36 plates in each column of the interambulacra. It resembles the holotype in all respects, apart from a slight difference in colouration. It lacks the small patches of purplish-brown observed in the aboral interambulacral mid-lines of the holotype.

DISCUSSION.—Four other species of *Asthenosoma* (*A. varium*, *A. ijimai*, *A. dilatatum* Mortensen, and *A. intermedium* Clark) are known. *A. dilatatum* is known only from two young specimens and is distinguished from other species of *Asthenosoma* by the possession of large tridentate pedicellariae which have broad leaf-shaped valves. Two specimens of *A. intermedium* are known. Both were found at Lindeman Island, Queensland, and were the only specimens of *Asthenosoma* previously taken from Australian waters. Clark (1938) stated with reference to *A. intermedium* “that the more numerous and very low plates, the tuberculation and the colouration distinguish the Australian species from *ijimai* whilst the same features and the pedicellariae also, prevent confusion with *varium*.” This statement requires discussion.

Although the holotype of *A. intermedium* possesses many more plates in each column of the ambulacra than do specimens of *A. varium* and *A. ijimai* of similar size, it possesses fewer plates in each column of the interambulacra. This is also

true of *A. periculosum* and this species further resembles *A. intermedium* with respect to the shape and arrangement of the ambulacral and interambulacral plates. The primary spines are also similar in the two species. Because of the dried condition of the specimens of *A. intermedium* examined by Clark, he was unable to determine the degree of development of the venom glands on the aboral spines, but states that they were undoubtedly present. The apical system of *A. intermedium* differs from that of *A. periculosum* but the differences may be related to size.

On the other hand, the tuberculation of *A. intermedium* differs considerably from that of *A. periculosum*. Only three to four secondary spines are carried by ambulacral plates on the aboral side in *A. intermedium* whereas those of *A. periculosum* carry three to four times as many. Also, the arrangement of the primary tubercles on the oral side of each species is different. The primary tubercles of the oral ambulacral plates of *A. periculosum* form two series, and the adradial tubercles of the oral interambulacral plates of this species form a regular series. There is a tendency for the primary tubercles of *A. intermedium* to be arranged in series, but these series are somewhat irregular. In the other species of *Asthenosoma* the primary tubercles are irregularly arranged.

It is in the pedicellariae that *A. periculosum* shows marked differences from *A. intermedium*. Clark (1938) states that the pedicellariae of *A. intermedium* were "apparently all of one kind, tridentate with rather elongate heads, the valves up to 2 mm. or more in length, in contact throughout, coarsely dentate near the tips and more or less carinate on the back, they thus resemble the smaller tridentate form of *A. ijimai*." The smaller of Clark's two specimens was shown to Mortensen, who commented that *A. intermedium* was intermediate between *A. varium* and *A. ijimai* and resembled the latter species in its pedicellariae. It is most unlikely that both Clark and Mortensen would have overlooked daetylous pedicellariae such as are possessed by *A. periculosum*.

The colouration of *A. periculosum* is distinctive and would enable ready recognition of the species in the field. In this respect, it should be noted that *A. varium* exhibits great variation in colour and its spines are banded. Thus colouration is not a feature distinguishing *A. varium* from *A. intermedium* as maintained by Clark (1938).

Because of the presence of daetylous pedicellariae and the presence of a regular series of primary tubercles at the adradial end of each oral interambulacral plate in *A. periculosum*, difficulties arise concerning the generic status of the species. The definition of the genus *Asthenosoma*, as restricted by Mortensen (1935), requires modification if *A. periculosum* is to be included. On the other hand, there appears to be no justification for the erection of a new genus to accommodate the species. In *A. intermedium* there is a distinct tendency for the primary tubercles to be serially

arranged and the serial arrangement of some of the primary tubercles in *A. periculosum* does not appear to be a feature of great taxonomic importance. The possession of dactyloous pedicellariae separates *A. periculosum* from other species of *Asthenosoma*. Moreover, the dactyloous pedicellariae are of the type possessed by the genus *Hapalosoma* Mortensen, and the possession of pedicellariae of this type is perhaps the main point of difference between *Hapalosoma* and the genus *Araeosoma* Mortensen. However, the presence of skin-sacs on the aboral spines and the complete absence of primary tubercles from the aboral side of the test are features which enable *A. periculosum* and other species of *Asthenosoma* to be separated readily from species belonging to the genera *Hapalosoma* and *Araeosoma*.

Apart from the possession of oral primary tubercles in regular series and the possession of dactyloous pedicellariae, *Asthenosoma periculosum* conforms with the diagnosis of the genus *Asthenosoma* as restricted by Mortensen. It is suggested that Mortensen's diagnosis of the genus be widened so as to include forms possessing dactyloous pedicellariae and forms which possess primary tubercles in regular series on the oral side of the test.

Professor W. Stephenson, who handled the fresh specimens of *A. periculosum* when they were brought to the surface, received two punctures in a finger as a result of contact with the aboral spines of one specimen. Pain was immediate and severe, and the stings were likened to those caused by wasps. No systemic effects were noted and there were no obvious after-effects resulting from the stings. Mortensen (1935) stated that all echinothurids sting very badly by means of their poison-spines and refers to a belief that stings from *Asthenosoma* are sometimes fatal. It is evident that fresh specimens of the southern Queensland *Asthenosoma* require careful handling, and the species is given the name *periculosum* to draw attention to this fact.

LITERATURE CITED

- Clark, H. L., 1938. Echinoderms from Australia. *Mem. Harv. Mus. Comp. Zool.*, 55 (1-8), pp. 1-597, pls. 1-28.
- Mortensen, T., 1935. A Monograph of the Echinoidea. II. Bothriocidaroida, Melonechinoida, Lepidocentroida, and Stirodonta. Copenhagen: C. A. Reitzel.

EXPLANATION OF PLATE XII

Asthenosoma periculosum sp. nov., holotype.

Fig. 1. Aboral surface.

Fig. 2. Oral surface.